DIY

Worthwhile projects you can build on your own

1.25-meter folded dipole antenna

As far as I could tell, we've never highlighted any project for the 1.25-meter band, also called the "220" band, because of its frequency range, from 219 MHz to 225 MHz. (We tend to focus on the 222 MHz to 225 MHz sub-band, where voice communication is permitted.) Furthermore, I don't believe we've ever featured a folded dipole (see *How a Yagi antenna works*, in the *Brass Tacks* column of this issue) either. So, I thought it would be fun to combine the two into a single project, and see how that works for us. We'll test it first on the NanoVNA, then on our club's repeater, which is 224.560– MHz (100.0 Hz tone).

A folded dipole is like two complete dipoles, connected in parallel. The resulting antenna is therefore about an entire wavelength long, and is nothing more than a "squashed, full-wavelength loop" whose ends connect directly into the feed line. According to online calculators, the antenna exhibits an impedance of about 288 ohms at the feed point, requiring a *match* to bring it down to 50 ohms (6:1), or at least 75 ohms (4:1), which is more practical.

Parts list

One 36″ PL-259 coax pigtail
One mop handle
Four 1¼″ #6-32 zinc-plated machine screws
Bits of rubber sheeting (for insulation)
One 2″ PVC coupling
5 feet 6 AWG bare solid copper wire
Four ¼″ ground cable straps
Sharpie™

Construction

The picture on the next page (too large to fit here) shows our goals for this antenna, using the online folded dipole calculator, with our target frequency set to 224.5 MHz. First, straighten the 6 AWG bare copper wire as much as you can.

To form the two rounded ends of the folded dipole, wrap the 6 AWG wire around a 2″ PVC coupling, which actually has an outside diameter of 2¾″, or a radius of 1.375″, close to the 1.54″ specified ("R") by the calculator. From one end of the wire (touching dotted line C), measure 9.69″ for Length D, and mark the spot as one of the two tangents to the coupling. Firmly and carefully wrap the wire half-way around the coupling, and mark the second tangent point on the opposite side from the first tangent. Remove the coupling and mark the third tangent at 19-3/8″ from the second tangent mark. Wrap the wire half-way around the coupling at the third mark, and mark the fourth tangent point on the opposite side from the third tangent.

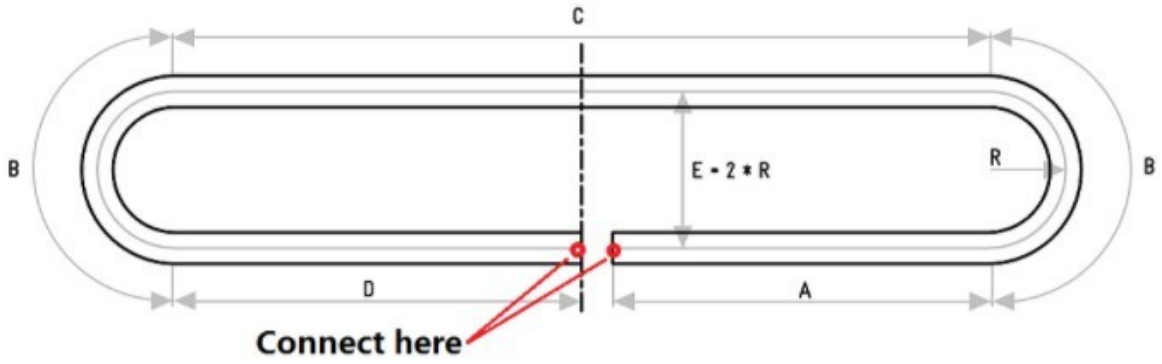



DIY, continued

1.25-meter folded dipole antenna

Folded Dipole Calculator

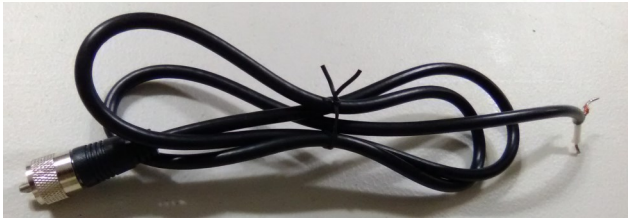
To be combined with a Yagi Uda Antenna or used as is.



Frequency [MHz]	224.5	Length units	○ mm ◉ inch
Length A	9.21	Length Gap	0.48
Length B	4.85	Radius R	1.54
Length C	19.38	Rod Diameter	0.18
Length D	9.69	Total Length	48.45

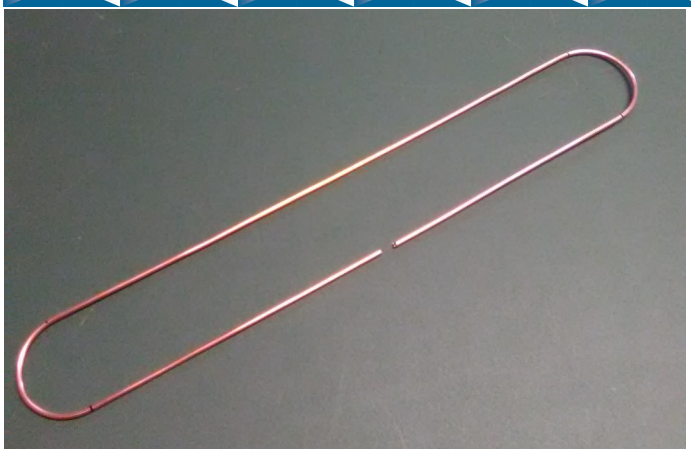
CALCULATE

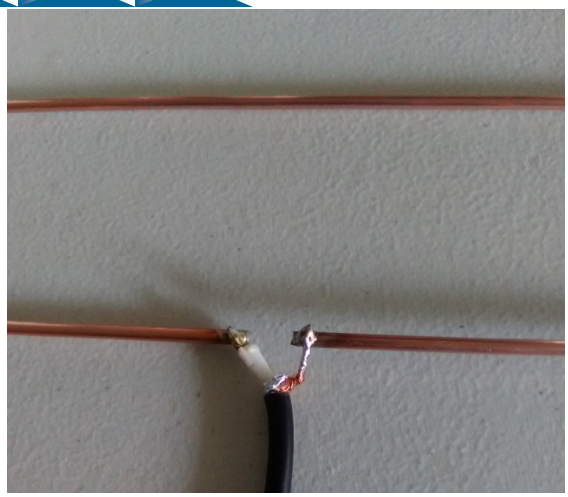
Cut the wire such that a ½″ gap remains between the two ends of the wire. The "PL-259 coax pigtail" is nothing more than a piece of coax, like RG-8X, with a PL-259 connector on one end, and bared wires on the other. Any length 36″ or longer will be ideal.



DIY, continued

1.25-meter folded dipole antenna



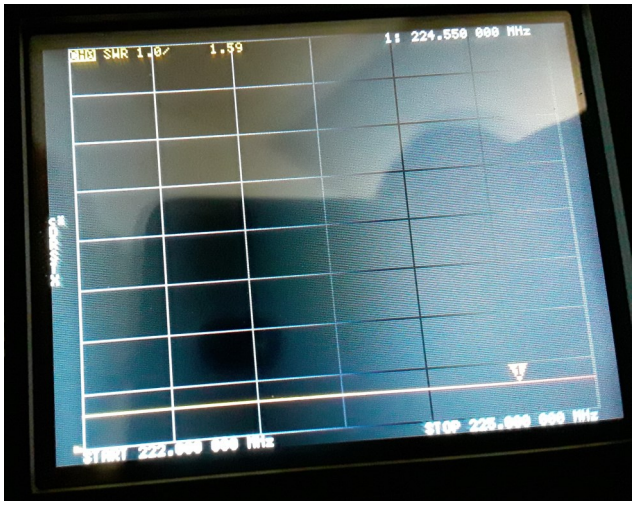


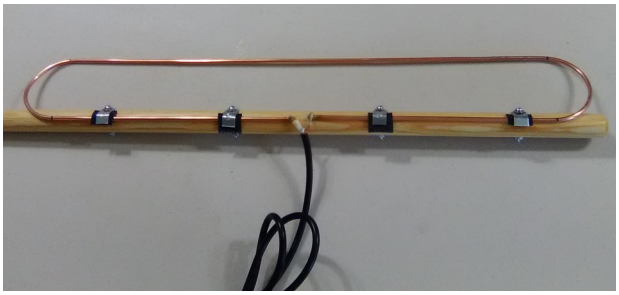
The perfectly formed folded dipole element

Solder the pigtail bare ends to the ends of the folded dipole 6 AWG wire ends, taking care to maintain the ½″ gap. For convenience, mount the finished loop on an appropriate mast. I'm using an old mop handle because it's non-conductive, rigid, and inexpensive (free); your imagination might find something better. If you choose to use a conductive mast (which in fact is what the great majority of 1.25-meter antennas are mounted on), be sure to keep the loop at least a quarter-wavelength away (13 inches, in our case) from the mast.

I mounted my loop by first drilling 1/8″ holes in the mop handle about 3″ and 8″ from one of the loop ends, and the same from the other end. I inserted a machine screw, flat washer, cable strap, and piece of rubber mat on one side, then a split washer and nut on the other, then repeated that for all the other holes. I used the rubber mat to insulate the hardware from the loop, but I probably didn't need to. And that's it...project complete, except for the testing.

Here's the NanoVNA result for SWR across the 1.25-meter band, about 1.56 at 224.550 MHz.





Couldn't do a simplex test, so I talked with my wife Lisa KR5LYS (without a 4:1 balun!) through the club repeaters, me on the 224.560 repeater, and she on the 146.780 repeater, and she said she could hear me very well, then asked what was for dinner tonight.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)